

Amendment
U.S. Patent Application No. 09/730,708

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

Claim 1 (currently amended): A process for producing carbon black comprising: introducing a fluid stream to sheath a process stream downstream from introduction of a feedstock into the process stream, wherein the fluid stream is introduced in an axial direction, and wherein the fluid stream has a swirl pattern.

Claim 2 (canceled)

Claim 3 (canceled)

Claim 4 (currently amended): The process of claim [[3]] 1, wherein the fluid stream comprises a gaseous stream including at least one of the following components: an oxidant, nitrogen, hydrogen, a hydrocarbonaceous material or mixtures thereof.

Claim 5 (original): The process of claim 4 wherein the fluid stream comprises tail gas.

Claim 6 (currently amended): A process for producing carbon black blacks comprising:

generating a stream of combustion gases in a first stage of a reactor having a velocity sufficient to flow through subsequent stages of the reactor and a temperature sufficient to pyrolyze a carbon black yielding feedstock, and passing said combustion gases through a zone of converging diameter having an upstream and a downstream end and converging from the upstream end towards the downstream end,

injecting a carbon black yielding feedstock into the combustion gas in a second stage

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of the reactor to produce an effluent composed of carbon black and combustion gases;

introducing a fluid stream in a direction axial to the flow of the effluent downstream from the injection of said carbon black yielding feedstock, the resulting sheathed effluent passing through at least a portion of a third stage of the reactor; and

cooling, separating, and recovering the carbon black product.

Claim 7 (original): The process of claim 6 wherein the fluid stream is introduced so as to sheath the effluent stream entering the third stage of the reactor.

Claim 8 (previously presented): The process of claim 7 wherein the fluid stream has a swirl pattern.

Claim 9 (original): The process of claim 7 wherein the fluid stream comprises a gaseous stream including at least one of the following components: an oxidant, nitrogen, hydrogen, a hydrocarbonaceous material or mixtures thereof.

Claim 10 (original): The process of claim 9 wherein the fluid stream comprises tail gas.

Claim 11 (withdrawn): A modular apparatus for producing carbon black comprising:

a combustion zone having an upstream and a downstream end and at least one port to allow the introduction of a fuel and an oxidant;

a zone of converging diameter having an upstream and a downstream end and converging from the upstream end towards the downstream end, the upstream end being connected to the downstream end of the combustion zone;

a transition zone having an upstream and a downstream end, the upstream end being connected to the downstream end of the zone of converging diameter, the transition

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including at least one port to allow the introduction of a feedstock;

an apparatus for introducing a fluid stream into the reactor in a direction axial to the flow of a process stream in the reactor, the apparatus having an upstream and a downstream end, the upstream end being connected to the downstream end of the transition zone;

a reaction zone having an upstream and a downstream end, the upstream end being connected to the downstream end of the transition zone or zones;

a quench zone having an upstream and a downstream end, the upstream end being connected to the downstream end of the reaction zone, the quench zone including at least one port to allow the introduction of a quenching fluid; and

apparatus for separating and collecting carbon black connected to the downstream end of the quench zone or zones.

Claim 12 (withdrawn): The modular apparatus for producing carbon black of claim 11 wherein the apparatus for introducing a fluid stream into the reactor in an axial direction comprises a hollow vessel; at least one inlet for introducing a fluid stream into the interior of the vessel and an outlet to allow the fluid stream to exit from the vessel.

Claim 13 (withdrawn): The apparatus of claim 12 wherein the outlet comprises an annulus.

Claim 14 (withdrawn): The apparatus of claim 12 wherein the inlet of the hollow vessel is disposed radially to the outlet to produce an outlet fluid stream without significant swirls.

Claim 15 (new): The process of claim 6, further comprising introducing said combustion gases into a transition zone having an upstream and a downstream end, the

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upstream end being connected to the downstream end of the zone of converging diameter.